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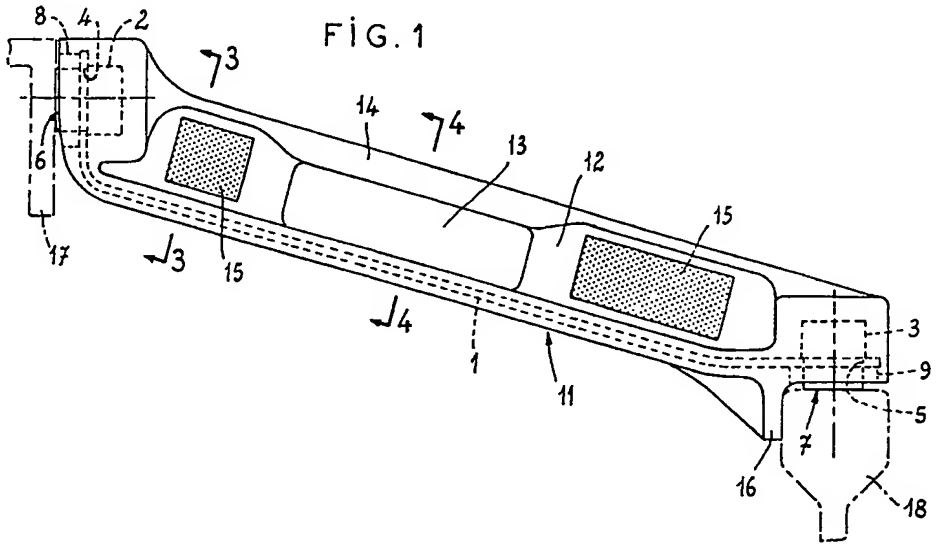
(54) Railway short circuit safety device

(57) The device is used especially when maintenance work is being carried out on metropolitan railway systems. It comprises an electrical conductor bar 1 including in its median part an insulating handle 13, 14 and having at its ends electrical connection surfaces 6, 7 intended to be placed against a supply rail 17 and another rail 18 respectively. According to the invention, permanent magnets 2, 3 provide the connection surfaces 6, 7 thus ensuring good connection pressure between the bar and the rails while allowing the bar to be lighter. The conductor bar 1 including the magnets 2, 3 can be wrapped in a moulded insulating envelope 11 forming the handle and abutment 16 with only the electrical connection surfaces 6, 7 and possibly the cup-shaped spark arresters 8, 9 being exposed.

FIG. 1



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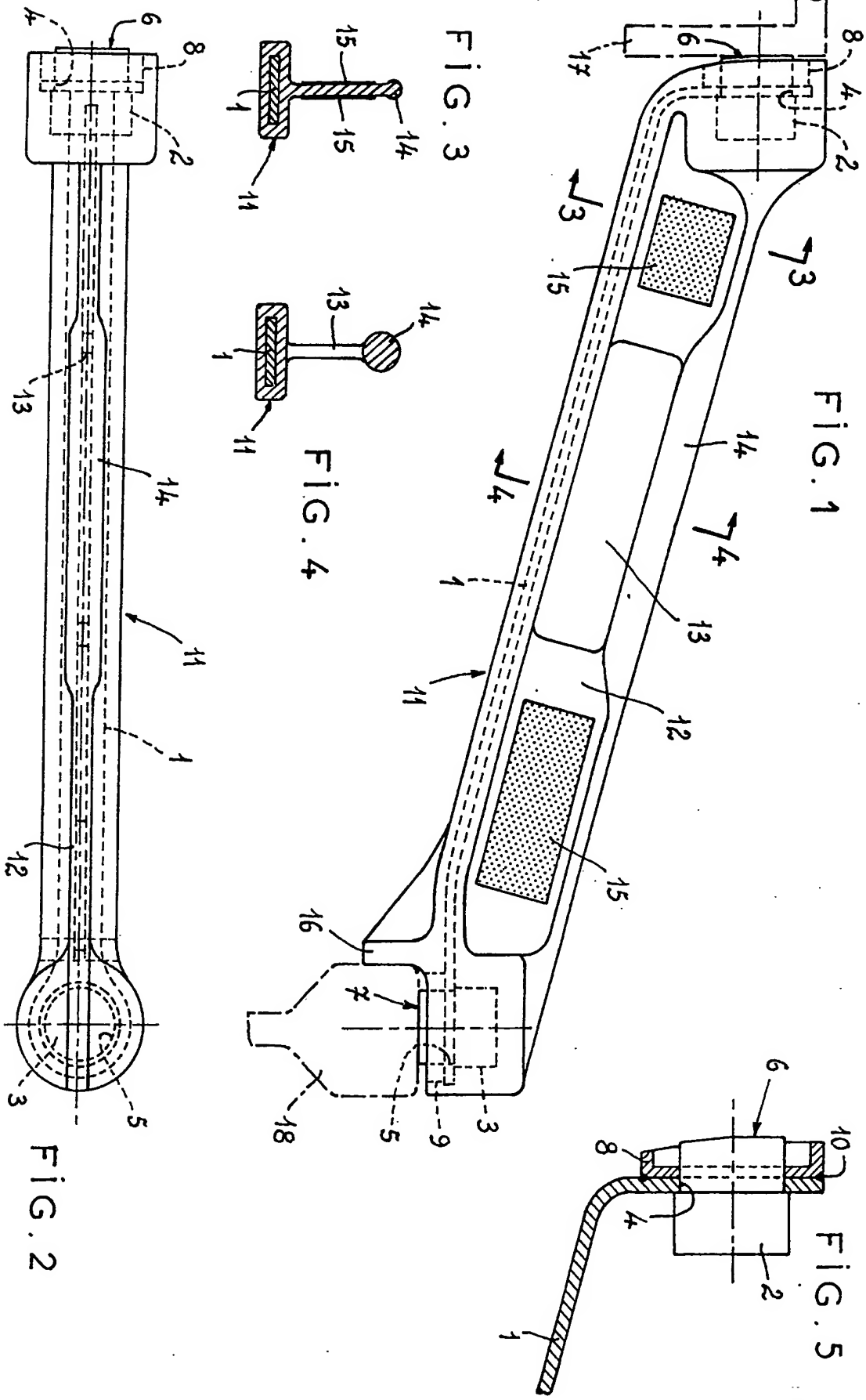

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

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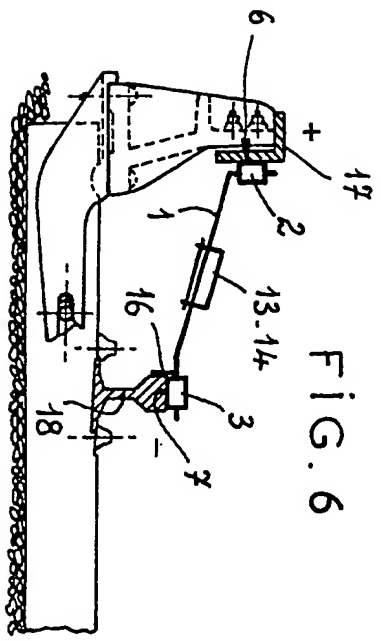

FIG. 6

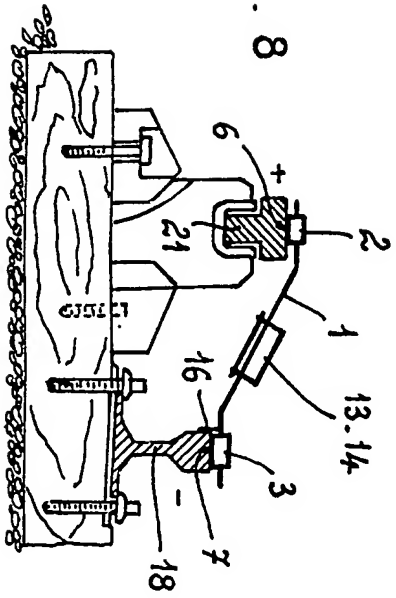

FIG. 8

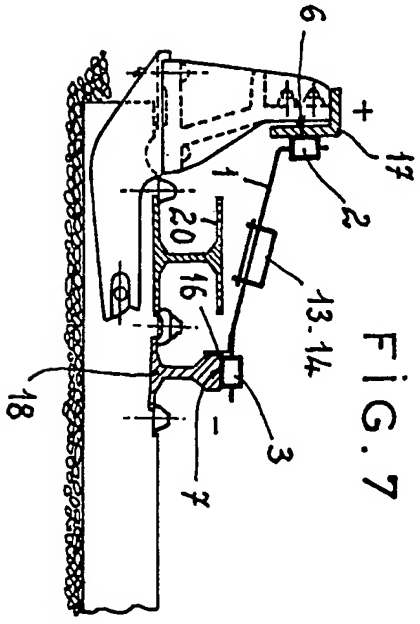

FIG. 7

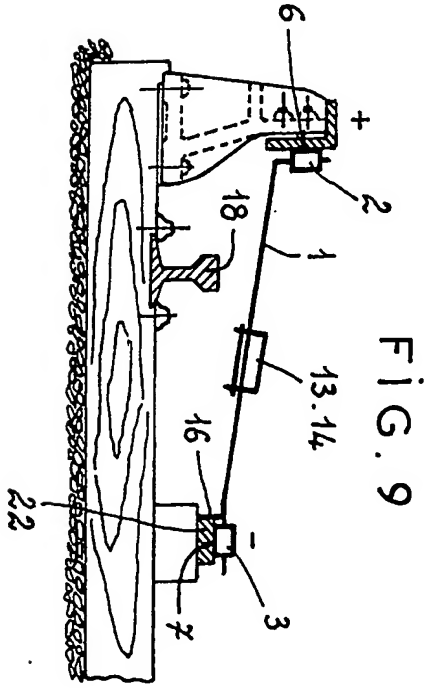

FIG. 9

SPECIFICATION

Short circuit device f r lectric traction syst ms

The present invention concerns a short circuit track for transport systems using one or more guide rails and/or a "third rail" for electrical traction supply and especially for a metropolitan system or a "metro".

When one works on metro systems equipped, for example, with a supply bar arranged in a vertical plane and possibly serving as a lateral guide rail, as a measure of security, not only is the electrical current supply cut, but furthermore a safety device known as a "short circuit" is placed between the supply bar and the negative rail which is generally one of the load-bearing rails.

The short circuits presently used for this purpose are generally made from a galvanised iron bar, comprising in its median part, an insulating handle and having at each end an electrical connection surface. The two electrical connection surfaces are arranged at 90°, relative to each other, so that one may be rested against the vertical plane of the supply bar and the other on the top of the bearing rail; a back pressure stop being provided near the connection surface and intended to be applied on the bearing rail.

With such a short circuit the connection pressure is developed solely by the weight of the device. It is easily understood that although the pressure (being exerted horizontally) of the connection surface against the supply bar situated in a vertical plane may be sufficient, it is necessary that the weight of the short circuit is sufficient to provide adequate pressure on the horizontal surface. For this reason the short circuits generally used weigh about 6 to 7 kilogrammes.

The increased weight of the present short circuits make these devices hard to handle, penalise the down time of the maintenance teams and do not ensure protection for the personnel.

The short circuits presently used include other disadvantages on the safety design:

— These short circuits tend to be ejected, in the case of reintroduction of electrical supply or, in the case of exposure under supply, that is to say when they are needed.

The present devices, which in spite of their weight, exert a relatively low connection pressure and do not ensure a good short circuit, in particular in the circumstances such as: a film being provided by the presence of glazed frost or hoar frost (in the case of ends of systems situated in the open air) or the presence of non-conductive deposits, especially greasy substances, on the supply bar and/or rail.

The present invention aims to obviate or mitigate these disadvantages by producing an improved short circuit, giving complete satisfaction from the point of view of manageability and safety.

To this purpose, in the short circuit which is the object of the present invention comprises an electrical conducting rail, in its median part an insulating handle and at each end an electrical connection surface intended to rest on a supply bar possibly serving as a lateral guide rail or on a bearing rail or on a "third rail", a permanent magnet being connected to each connection surface to ensure the connection pressure on the bar or rail.

The idea of the basis of the invention thus resides in the use of permanent magnets, two in number and connected respectively to two connection surfaces, these magnets ensuring the application of the said surfaces against the bar or metallic rail by magnetic force in such a way that the weight of the device interfering is of minor importance. Thus, the short circuit according to the invention can be light (weight gain of 50% in relation to present devices) thus manageable which will incite the maintenance personnel of the tracks to use it and bring about time gains.

The effect of "fixing" resulting from the presence of the permanent magnets also prevents any ejection of the short circuit when the electrical supply is returned, even when it is very powerful, as well as any rebound of the device when the supply is present. Furthermore, this device brings about a very high quality short circuit, particularly when the optimal conditions are not present, in the case of the presence of glazed frost, hoar frost, greasy substances on the bar or rail, the pressure drawn to the magnet ensures above all a good electrical contact. Tests carried out have shown, however, that the use of the device does not accompany any demagnetization.

Following a special embodiment of the invention, the permanent magnets, metallic and of generally cylindrical external form, are assembled by force in circular holes arranged at two ends of the conducting bar, the said magnets themselves contacting the electrical connection surface. The conducting assembly thus formed by the bar and by the two permanent magnets can be wrapped in a moulded insulating envelope forming the handle and possibly the back pressure stop and only the electrical connection surfaces being exposed.

Advantageously, these electrical connection surfaces are encircled each one, with a conducting cup to serve as spark arresters, electrically connected to the conducting bar.

In any event, the invention will be better understood by way of the following description, referring to the enclosed diagrammatic drawings showing by way of non-limited example, an embodiment of this short circuit and illustrating its application on various collecting current systems with bars and/or rails:

Fig. 1 is a front view of a short circuit of the present invention,

Fig. 2 is a plan view about this short circuit,

Figs. 3 and 4 are sectional respectively according to 3—3 and 4—4 of Fig. 1;

Fig. 5 is a partial front view of the conducting bar with one of the magnets and one of the cup spark arresters (the moulded insulating envelope being assumed to be removed);

Figs. 6 to 9 are cross sectional views showing

four collecting current systems to which the short circuit, object of the present invention, is adapted, indicated very schematically.

Figs. 1 to 5 show a short circuit which includes an electrical conducting bar, for example in copper or in aluminium alloy, at the two ends of which are mounted permanent magnets, respectively *2* and *3*. These magnets, metallic and of generally cylindrical external form (commercialised under the name "suction magnets") are force fitted in circular holes *4* and *5* respectively, arranged at two ends of the conducting bar *1*, so as to execute a very good electrical contact, due to the fact that the magnets *2* and *3* provide the two electrical connection surfaces, respectively *6* and *7*. As is shown in Fig. 1 and more particularly in Fig. 5 the two electrical connection surfaces *6* and *7* are encircled, each one, with a conducting cup respectively *8* and *9* serving as spark arresters, each cup, such as that designated by *8* is arranged coaxially to the corresponding magnet *2* and coupled against the corresponding end of the conducting bar *1* to which it is linked, for example by an annular soldered joint *10*.

The conducting assembly made up of the bar *1*, the two permanent magnets *2* and *3* and the two cup spark arresters *8* and *9* is wrapped up in a moulded insulating envelope *11*, for example of plastics material, only leaving the electrical connection surfaces *6* and *7* exposed and the faces turned towards the exterior of the cups *8* and *9*. The ensulating envelope *11* forms a longitudinal web *12* broken in its median part by an opening *13* limited by a flange *14* to make up a handle intended to control the device, on both sides of the central handle *13—14* and on its two faces, the web *12* support plates equipped with reflectors *15* intended to signal the presence of the device (see Figs. 3 and 4). Near one of the connection surfaces *7* the moulded insulating envelope *11* forms furthermore a back pressure stop *16*.

When the short circuit described here is in use the connection surfaces *6* is substantially vertical and the connection surface *7* is substantially horizontal. As shown in Fig. 6 this arrangement enables the placement of the short circuit between a lateral current supply bar *17* of L shape and a bearing rail *18* on a metropolitan system with picking up of lateral current and bearing "iron on iron".

— The connection surface *6* is applied against the vertical arm of the supply bar *17* by the magnet *2*.

— The connection surface *7* is applied on the top of the bearing rail *18* by the magnet *3* whilst the back pressure stop *16* abuts one of the sides of the top of the same rail *18*.

Fig. 7 illustrates the application of the short-circuit, the object of the present invention, on a metropolitan system equipped with pneumatic wheels rolling on a bearing track *20*. The current collector is provided on a supply bar *17* forming also lateral guide rail and a safety bearing rail *18* is provided. As before, the short circuit is placed between the bar *17* and the rail *18* by spanning the bearing track *20*.

The short circuit, the object of the present invention, is also suitable as shown in Figure 8, for a system in which the collecting current is made by a lateral "third rail" *21* of T shape. For this application the electrical connection surface *6*, to which the magnet *2* is connected, is horizontal so as to take support against the upper face of the "third rail" *21*. As before the other electrical connection surface *7* is horizontal and is applied on the bearing rail *18*.

Figure 9 illustrates, finally, a last cast of application in which the short circuit, carried out according to the same principle but of greater length, electrically connects a lateral supply bar *17* to a central "third rail" *22* by spanning the bearing rail *18*.

Of course, and following from what has gone before, the invention is not limited to a sole form of execution of this short circuit track which has been described above, for example it includes, on the contrary, all the variables and uses imagined according to the same principle whatever they may be, especially the forms of detail and particular adaptations by way of characteristics of a given system. In particular in the place of cups *8* and *9* it can be foreseen that electrical connection surfaces *6* and *7* are encircled, each one with a single spark arrester bored in the moulded insulating envelope *11* and especially coming from the moulding with the said envelope *11*.

CLAIMS

1. Short circuit track, for transport systems using one or more guide rails and/or a third rail for electrical traction supply and especially for metropolitan systems, comprising an electrical conducting bar including, in its median part, an insulating handle and having at each end an electrical connection surface intended to be supported on a supply bar serving possibly as a lateral guide rail, on a bearing rail or on a third rail in which each connection surface is connected to a permanent magnet fitted to ensure the connection pressure on the bar or the rail.

2. Short circuit track according to claim 1, in which the permanent magnets are metallic, of generally cylindrical external shape and are force fitted in circular holes arranged at the ends of the conducting bar, the said magnets themselves providing the electrical connection surfaces.

3. Short circuit track, according to claim 1 or claim 2, in which the conductor assembly formed by the bar and by the two permanent magnets is wrapped in a moulded insulating envelope forming the handle and possibly the back pressure stop and only the electrical connection surfaces are exposed.

4. Short circuit track according to claim 3, in which the moulded insulating envelope supports, on both sides of the central handle and on its two faces, plates equipped with reflectors.

5. Short circuit track according to any one of

claims 1 to 4 in which the electrical connection surfaces are encircled, each one, with a conducting cup to serve as spark arresters, electrically linked to the conducting bar.

6. Short circuit track according to claim 3 or 4 in which the electrical connection surfaces are encircled, each one, with a spark arrester, bored into the moulded insulating envelope and especially coming out of the moulding with the said envelope.

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